Using photochemistry to separate plutonium and uranium
12 October 2022, by Bob Yirka

A team of researchers at Los Alamos National Laboratory has developed a way to use photochemistry to separate plutonium and uranium—work that could make it easier to store nuclear waste. In their paper published in the journal Chemical Communications, the group describes their purification process.

In order to use plutonium in weapons or in electricity generating plants, it must first be purified. One common purification process involves the separation of plutonium and uranium—work that could make it easier to store nuclear waste. In their paper published in the journal Chemical Communications, the group describes their purification process.

Prior research has shown that the application of photochemistry to uranium processing is possible under certain circumstances. More specifically, researchers have found that both visible and ultraviolet light can be used to tune oxidation states. Other experiments have shown that similar processes could be used to separate actinides. In their work, the researchers used UV-vis light to induce plutonium$^{4+}$ and uranium$^{6+}$ into becoming plutonium$^{3+}$ and uranium$^{4+}$. This allowed the use of more traditional separation methods to complete the purification process.

The photochemistry process resulted in light-induced redox reactions without the need for other agents, so less toxic waste was produced. In their work, the team showed that the use of energy-efficient LEDs results in a more efficient process. The researchers suggest their process is a candidate for piggybacking onto work by the larger catalysis community studying the possibilities of light-induced reactions.


© 2022 Science X Network